Docket No.: 1560-0348P
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Yasuhiro ISHII et al.

Application No.: 09/655,847 Confirmation No.: 9788

Filed: September 6, 2000 Art Unit: 3682

For: ELECTRIC POWER STEERING APPARATUS Examiner: W. C. Joyce

REPLY BRIEF

MS Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

As required under § 41.37(a) and § 41.39(b)(2) this brief is filed in response to the new grounds of rejection raised in the Examiner's Answer dated March 22, 2007.

This brief contains items under the following headings as required by 37 C.F.R. § 41.37 and M.P.E.P. § 1206:

I.	Real Party In Interest
II	Related Appeals and Interferences
III.	Status of Claims
IV.	Status of Amendments
V.	Summary of Claimed Subject Matter
VI.	Grounds of Rejection to be Reviewed on Appeal
VII.	Argument
VIII.	Claims
Appendix A	Claims
Appendix B	Evidence
Appendix C	Related Proceedings

I. REAL PARTY IN INTEREST

The real party in interest for this appeal is:

Koyo Seiko Co., Ltd.

II. RELATED APPEALS, INTERFERENCES, AND JUDICIAL PROCEEDINGS

There are no other appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

A. Total Number of Claims in Application

There are 12 claims pending in application.

B. Current Status of Claims

1. Claims canceled: 8 and 13
2. Claims withdrawn from consideration but not canceled: 5 and 6
3. Claims pending: 1-7, 9-12 and 14
4. Claims allowed: none
5. Claims rejected: 1-4, 7, 9-12 and 14

C. Claims On Appeal

The claims on appeal are claims 1-4, 7, 9-12 and 14

IV. STATUS OF AMENDMENTS

Applicant did not file an Amendment After Final Rejection.

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TRANSMITTAL FORM

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Total Number of Pages in This Submission	

Application Number	09/655,847-Conf. #9788
Filing Date	September 6, 2000
First Named Inventor	Yasuhiro ISHII
Art Unit	3682
Examiner Name	W. C. Joyce
Attorney Docket Number	1560-0348P

ENCLOSURES (*Check all that apply*)

- [ ] Fee Transmittal Form
- [ ] Fee Attached
- [ ] Amendment/Reply
- [ ] After Final
- [ ] Affidavits/declaration(s)
- [ ] Extension of Time Request
- [ ] Express Abandonment Request
- [ ] Information Disclosure Statement
- [ ] Certified Copy of Priority Document(s)
- [ ] Reply to Missing Parts/ Incomplete Application
- [ ] Reply to Missing Parts under 37 CFR 1.52 or 1.53
- [ ] Drawing(s)
- [ ] Licensing-related Papers
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- [ ] Power of Attorney, Revocation Change of Correspondence Address
- [ ] Terminal Disclaimer
- [ ] Request for Refund
- [ ] CD, Number of CD(s) _____
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- [ ] After Allowance Communication to TC
- [ ] Appeal Communication to Board of Appeals and Interferences
- [x] Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
- [ ] Proprietary Information
- [ ] Status Letter
- [ ] Other Enclosure(s) (please Identify below):

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	BIRCH, STEWART, KOLASCH & BIRCH, LLP		
Signature	#37,750		
Printed name	Michael K. Mutter		
Date	May 16, 2007	Reg. No.	29,680

V. SUMMARY OF CLAIMED SUBJECT MATTER

The following description is an exemplary reading of the claim language on embodiments of the present application and is not intended to limit the scope of the claims.

Independent Claim 7

Claim 7 recites an electric power steering apparatus and a steering shaft 2 that is configured to engage a steering wheel 1 as illustrated in Figure 2. With reference to Figure 3, the power steering apparatus includes an electric motor 6 (page 7, lines 20-24) for steering assistance and a worm shaft 70 (page 9 line 21) on which a worm (71) is disposed. A worm wheel 72 is disposed on the steering shaft 2, and rotary motion of the electric motor 6 is transmitted through the worm shaft 70 to the worm wheel 72 (page 9, line 19 through page 10, line 4). A biasing member 30 biases the worm shaft 70 toward the worm wheel 72 via a bearing 17 (page 10, lines 19-21). In addition, a concave member 83 accepts the bearing 17, and a housing 8 houses the bearing 17 and the concave member 83. Furthermore, the biasing member 30 is movably acceptable only toward the concave member 83.

Claim 1

Claim 1 depends from claim 7 and further recites that the biasing member 30 biases the worm shaft 70 toward the worm wheel 72 in a deflective direction of the worm shaft 70.

Claim 2

Claim 2 depends from claim 1 and recites that the worm shaft 70 is deflectable in a side of the worm shaft (the right side in Figure 3) interlocked with an output shaft 60 of the electric motor 6.

Claim 3

Claim 3 depends from claim 1 and recites that the worm shaft 70 is supported in a gear housing 8 having a tapped hole 84 and that the biasing member 30 includes a screw body 33 tightly fastened in the tapped hole 84. A spring body 32 is interposed between the screw body

33 and the worm shaft 70.

Claim 4

Claim 4 depends from claim 1 and recites that the worm shaft 70 is supported in a gear housing 8 having a tapped hole 84 and the biasing member 30 includes a screw body 33 which is tightly fastened in the tapped hole 84 and which is in contact with the worm shaft 70 or a bearing 17 fitted to the worm shaft 70.

Claim 10

Claim 10 depends from claim 7 and recites that the bearing 17 may be deflected into the concave member 83.

Claim 11

Claim 11 depends from claim 7 and recites that the steering wheel 1 is directly connected to the steering shaft 2.

Claim 14

Claim 14 depends from claim 1 and describes a space between the concave member 83 and the biasing member 30. The space is defined in part by second bearing hole 82 and can be seen in Figure 4. When biasing member 30 biases the worm 71 toward the worm wheel 72, the biasing member 30 moves within the space and is accepted in the concave member 83.

Independent Claim 9

With reference to Figure 2, claim 9 recites an electric power steering apparatus and a steering shaft 2 having a worm wheel 72 (Figure 3), the steering shaft 2 being configured to engage a steering wheel 1. With reference to Figure 3, the power steering apparatus includes an electric motor 6 for steering assistance and a worm shaft 70 on which a worm 71 is disposed. A rotary motion of the electric motor 6 is transmitted through the worm shaft 70 to the worm wheel

72. A biasing member 30 biases the worm shaft 70 toward the worm wheel 72 via a bearing 17, and a housing 8 that directly holds the bearing 17 is the same housing 8 that holds the biasing member 30. A concave member 83 accepts the bearing 17. The biasing member 30 is movably acceptable only toward the concave member 83.

Independent Claim 12

Claim 12 recites an electric power steering apparatus, illustrated in Figure 2, that includes an electric motor 6 for steering assistance and a worm shaft 70 on which a worm 71 is disposed. A worm wheel 72 is fixedly held on a steering shaft 2 connected to a steering wheel 1, and the rotary motion of the electric motor 6 is transmitted through the worm shaft 70 to the steering shaft 2. A biasing member 30 biases the worm shaft 70 toward the worm wheel 72 to reduce or eliminate backlash, and the biasing member 30 is movably acceptable only toward the concave member 83.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-4, 7, 9-12 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eda, U.S. 6,044,723 in view of JP 60-191758 (hereinafter, "Kamimura").

VII. ARGUMENT

Independent Claim 7

Claim 7 is rejected as being unpatentable over Eda in view of Kamimura. As discussed below, it is respectfully submitted that the examiner has not explained how the Eda reference should be modified in order to produce the invention of claim 7 and has not provided a proper reason for modifying Eda based on Kamimura. For at least these reasons a prima facie case of obviousness has not been presented. Furthermore, even if a reason for modifying Eda were provided, the result would not be the invention defined by claim 7. Each of these issues is addressed below.

Section 706.02(j) of the MPEP provides that when an examiner makes a rejection under Section 103, he should "set forth in the Office action: (A) the relevant teachings of the prior art

relied upon, preferably with reference to the relevant column or page number(s) and line number(s) where appropriate, (B) the difference or differences in the claim over the applied reference(s), (C) the proposed modification of the applied reference(s) necessary to arrive at the claimed subject matter, and (D) an explanation why one of ordinary skill in the art at the time the invention was made would have been motivated to make the proposed modification." In the present case, the Examiner's Answer indicates that it would have been obvious to "modify the worm gear arrangement of Eda et al. with the mechanism for setting backlash taught by Kamimura" without providing any indication as to what modification is being proposed. This may be because there is no simple part for part replacement that can be made. Instead, it seems that a complex rearrangement of Eda's parts would be required to combine Eda and Kamimura in any manner, and it is not clear how or whether such rearrangement would work or why one skilled in the art would attempt it.

Eda provides a worm and worm wheel arrangement in which axial loads created by backlash are absorbed using springs 10a and 10b. Eda does not include any mechanism for setting backlash that can be replaced with part of Kamimura's device. The examiner may be proposing to replace Eda's bearing 8b with element 42 of Kamimura, but he does not indicate whether Eda's coned disk springs 10b should be removed or retained. If the springs are removed, Eda would not longer absorb axial loads, and the examiner's modification would impermissibly change the principle of operation of Eda's device. MPEP 2143.01. If springs 10b are retained, it is not clear that a support like Eda's support 42 could function under the axial loads imparted by backlash without binding in its support cylinder. Moreover, Kamimura appears to require the use of a flexible worm shaft 36 in order to employ his backlash adjusting device. If Eda's shaft 30 is made flexible, it is not clear that Eda's device would continue to function, especially since this newly flexible shaft would have to absorb axial loads. If Eda's shaft 30 is not made flexible, it is not clear whether any benefit could be obtained from Kamimura's elements even if they could somehow be added to Eda's device. These issues cannot be addressed because it cannot be determined from the record how the examiner believes Eda should be modified. For at least this reason, a prima facie case of obviousness has not been presented, and claim 7 should be allowed.

In addition, a reason or motivation for modifying Eda has not been provided. The motivation identified by the Office Action is "to prevent problems of backlash generation between worm gears and the fluctuation of torque required to turn the worm gears." However, the Eda patent is directed to a system that is supposed to prevent problems associated with backlash. Since Eda's device already addresses the problem of backlash, one skilled in the art would have no reason to look to Kamimura for a solution to a problem that has already been addressed. Because a proper reason for modifying Eda based on Kamimura has not been provided, a prima facie case of obviousness has not been presented, and claim 7 is submitted to be allowable for at least this reason.

Even if combined, Eda and Kamimura do not show or suggest the invention of claim 7. Claim 7 recites a biasing member biasing, via a bearing, a worm shaft toward a worm wheel. The examiner has alleged that Kamimura's spring 48 corresponds to the claimed biasing member. Claim 7 further recites a concave member accepting a bearing. The examiner appears to state that the opening in Kamimura's element 42 in which bearing 43 is mounted corresponds to the claimed concave member. Claim 7 further recites that the biasing member is movably acceptable only toward the concave member. However, Figure 1 of Kamimura makes clear that there is a gap between the bottom of leg 41 of element 42 and therefore spring 48 can move both toward and away from bearing 43, contrary to the language of claim 7. Claim 7 is submitted to be allowable over Eda and Kamimura for at least this reason.

The examiner offers an alternative interpretation of Kamimura wherein Kamimura's bolt 46 is considered to be a biasing member. However, unless it is rotated, bolt 46 is not movable toward or away from the concave member holding bearing 43. If bolt 46 is rotated, then it can move toward or away from bearing 43, contrary to the recitations of claim 7. Under no interpretation of Kamimura is bolt 46 only movable toward bearing 43 as would be required to satisfy a limitation of claim 7. For these reasons, claim 7 is submitted to be allowable over Eda and Kamimura based on this secondary interpretation of Kamimura as well.

Independent claim 12 is submitted to be allowable for at least the same reasons as claim 7. Dependent claims 3 and 4 are also submitted to be allowable for at least the same reasons as claim 7.

Independent Claim 9

Claim 9 is also rejected under 35 U.S.C. 103(a) as being unpatentable over Eda in view of Kamimura. As discussed above in connection with claim 7, the examiner has not explained what modification to Eda is being proposed or provided a proper reason or motivation for making any modification to Eda. The examiner has therefore also failed to present a prima facie case of obviousness in connection with claim 9, and claim 9 is submitted to be allowable for this reason.

Even if the proposed modification to Eda were identified and a reason for making such a modification were provided, the result would still not be the invention of claim 9. Claim 9 recites a biasing member biasing, via a bearing, a worm shaft toward a worm wheel. Claim 9 further recites that the housing that directly holds the bearing is the same housing that holds the biasing member. Bearing 43 is directly held in an opening near the top (as viewed in Figure 1) of Kamimura's element 42. Neither biasing member 48 nor biasing member 46 is located in the same opening that holds bearing 43. Claim 9 is submitted to be allowable over Eda in view of Kamimura for at least these reasons.

Dependent Claims

Claim 2

Applicant's Appeal Brief noted that the language of claim 2 has not been addressed in the Office Actions. Claim 2 is also not addressed in the Examiner's Answer. Claim 2 recites an interlocking member interlocking the worm shaft and a motor output shaft. The art of record does not show or suggest an interlocking member as claimed. Claim 2 is submitted to further distinguish over the art of record for this reason.

Claim 10

The Examiner's Answer suggests that Kamimura "anticipates" this claim. It is respectfully submitted that this rejection has not been previously raised, and that, in any case, Kamimura does not show an electric power steering apparatus. Claim 10 is therefore not

anticipated by Kamimura.

Claim 10 recites that the bearing may be deflected into the concave member. Kamimura shows a bearing that appears to contact the element alleged to be a concave member around the entire circumference of the bearing. The bearing therefore cannot be deflected into the concave member as required by claim 10. Claim 10 further distinguishes over the art of record for this reason.

Claim 14

Claim 14 recites that a space is established between the concave member and the biasing member. Claim 14 depends from claim 7 which defines a concave member as accepting a bearing. If element 41 of Kamimura is asserted to be a concave member, than this concave member does not accept a bearing 43. Furthermore, biasing members 48 and 46 in no manner move within a space between the concave member and a biasing member as claimed. Claim 14 is submitted to further distinguish over the art of record for this reason.

VIII. CLAIMS

A copy of the claims involved in the present appeal is attached hereto as Appendix A.

IX. CONCLUSION

For the foregoing reasons, it is respectfully submitted that claims 1-4, 7, 9-12 and 14 are allowable over the art of record. Wherefore, reconsideration and allowance of these claims is earnestly solicited.

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Respectfully submitted,

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APPENDIX A

Claims Involved in the Appeal of Application Serial No. 09/655,847

1. The electric power steering apparatus of claim 7, wherein
the biasing member biases said worm shaft deflectable toward said worm wheel, in a deflective direction of said worm shaft.

2. The electric power steering apparatus of claim 1, wherein
said worm shaft is deflectable in a side of said worm shaft, interlocked with an output shaft of said electric motor and an interlocking member interlocking said worm shaft and said output shaft is provided therebetween.

3. The electric power steering apparatus of claim 1, wherein
said worm shaft is supported in a gear housing having a tapped hole, and said biasing member includes a screw body tightly fastened in said tapped hole and a spring body interposed between said screw body and said worm shaft.

4. The electric power steering apparatus of claim 1, wherein
said worm shaft is supported in a gear housing having a tapped hole, and said biasing member includes a screw body which is tightly fastened in said tapped hole and which is in contact with said worm shaft or a bearing fitted to said worm shaft.

7. An electric power steering apparatus, comprising:
an electric motor for steering assistance;
a worm shaft on which a worm is disposed;
a steering shaft, configured to engage a steering wheel, on which a worm wheel is disposed and to which a rotary motion of said electric motor is transmitted through said worm shaft;
a biasing member biasing, via a bearing, said worm shaft toward said worm wheel;

a concave member accepting said bearing; and

a housing for housing said bearing and said concave member, wherein the biasing member is movably acceptable only toward the concave member.

9. An electric power steering apparatus, comprising:

an electric motor for steering assistance;

a worm shaft on which a worm is disposed;

a steering shaft, configured to engage a steering wheel, on which a worm wheel is disposed and to which a rotary motion of said electric motor is transmitted through said worm shaft;

a biasing member biasing, via a bearing, said worm shaft toward said worm wheel, wherein a housing that directly holds the bearing is the same housing that holds the biasing member; and

a concave member accepting the bearing, wherein the biasing member is movably acceptable only toward the concave member.

10. The electric power steering apparatus of claim 7, wherein the bearing may be deflected into the concave member.

11. The electric power steering apparatus of claim 7, wherein the steering wheel is directly connected to the steering shaft.

12. An electric power steering apparatus, comprising:

an electric motor for steering assistance;

a worm shaft on which a worm is disposed;

a worm wheel fixedly held on a steering shaft connected to a steering wheel, wherein the rotary motion of the electric motor is transmitted through the worm shaft to the steering shaft;

a biasing member biasing the worm shaft toward the worm wheel to reduce or eliminate backlash, wherein the biasing member is movably acceptable only toward the concave member.

14. The apparatus of claim 1, wherein a space is established between the concave member and the biasing member, wherein when the biasing member biases the worm toward the worm wheel, the biasing member moves within the space to be accepted in the concave member.

APPENDIX B -- (EVIDENCE APPENDIX)

No evidence is being relied upon and no evidence is attached.

APPENDIX C -- (RELATED PROCEEDINGS APPENDIX)

There are no related proceedings.